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(54) Abstract Title: **Messaging services between subscribers of mobile networks and subscribers of fixed telephone networks**

(57) Telecommunications network apparatus comprises determination equipment (1) which is configured to determine whether a message is provided with a destination address which is associated with a fixed network, and conversion equipment (3) which is configured to substitute an e-mail address for a destination address which is associated with a fixed network, the e-mail address being associated with the destination address. In use the determination equipment (1) determines whether the message is provided with a destination address associated with a fixed network, the conversion equipment receiving at least some of the messages which have been so determined, the conversion equipment (3) substituting an e-mail address for the destination address of the message, the e-mail address being associated with the destination address. The conversion equipment is provided with an associated memory comprising a database of destination addresses associated with at least one fixed network, and e-mail addresses associated with the destination addresses.

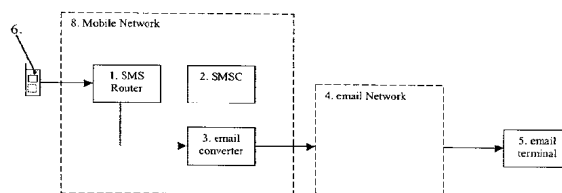


FIGURE 1

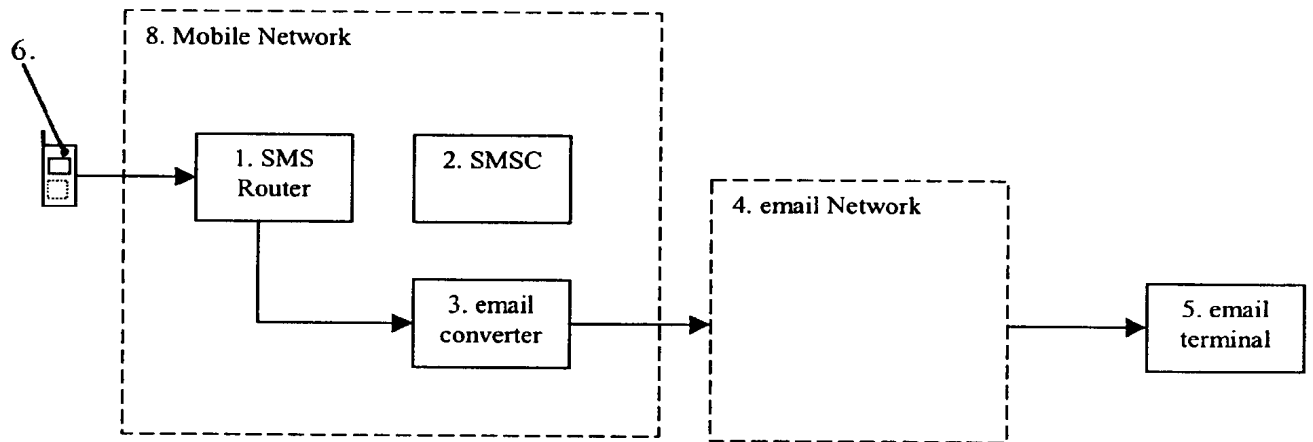


FIGURE 1

TELECOMMUNICATIONS SERVICES**APPARATUS AND METHODS**

The present invention relates to telecommunication services apparatus and methods and in particular, but not exclusively, to messaging services
5 between subscribers of mobile telephone networks and subscribers of fixed telephone networks, and methods for achieving the same.

In GSM the Short Message Service (SMS) allows Mobile Stations (MS) to send short text messages. The messages are normally routed via a Short Message Service Centre (SMSC) which provides a store and
10 forward function. The SMSC will attempt to deliver the message to its destination which may be another MS or a host address in the same or another network.

Following the great success of SMS in mobile networks, the Short Message Service began to be introduced in fixed telephone networks.
15 This was achieved using specialised equipment ("SMS transmission equipment") and new terminals which communicated over standard telephone lines using modem techniques. The SMS transmission equipment was usually connected to the Short Message Service Centre using a proprietary protocol. This architecture led to a usability problem
20 with SMS transmission between mobile networks and fixed networks because the SMSC to which the SMS transmission equipment was attached would normally only be able to receive messages from subscribers of the mobile network that hosted the SMSC. However it was usually possible for fixed network subscribers to send short messages
25 to any mobile network. The inability to transmit messages between any mobile network and the fixed network is both a problem for users and

also a lost revenue opportunity for mobile and fixed operators. Furthermore the availability of such a messaging service to a subscriber of a fixed telephone network is conditional on them obtaining a suitably capable telephone terminal, adapted for the purpose of receiving and
5 transmitting text messages on the fixed network. It is not therefore generally possible for the mobile subscriber to reach a significant proportion of fixed network subscribers using text messaging, whereas it is generally possible for a mobile subscriber to be able to reach the vast majority of other mobile subscribers.

10 In the prior art, it is known that short message transmission between fixed and mobile networks is already possible. The fixed network operator that wishes to enable this functionality must currently install specialised network equipment, and supply suitable terminals, that allow
15 text messages to be transmitted over normal telephone lines to fixed terminals. However for interconnect to the mobile networks, a connection to an operator's SMSC is required. This requires the mobile operator to make changes to his SMSCs in order to allow traffic destined for the fixed network to be passed over an interface to the fixed network. Implementing changes to SMSCs can be difficult and expensive, and the
20 fixed operator needs to interconnect independently with one or more mobile network.

When a short message is transmitted by a subscriber of a mobile telephone network, the message normally first passes to the SMSC of the subscriber's network. The SMSC will then check that the originating
25 subscriber's telephone number corresponds to that of a current subscriber to the network. Where mobile number portability has been implemented this check also requires that messages from subscribers who have ported in to the mobile network are accepted, while messages from subscribers

who have ported out from the network are rejected. The SMSC also checks the destination number for the message in order to determine how to deliver it. The SMSC uses the destination mobile telephone number (normally an MSISDN) to create a signalling query to the Home Location Register (HLR) in the destination network, which may be the same network or a different network.

If the destination network is not a mobile telephone network, then this signalling query will not normally be possible. Networks which have implemented a short message interconnect to a fixed network will, at this point be able to pass short messages destined for that fixed network over this interconnect. Short messages destined for other fixed networks will fail. Furthermore, networks that have not implemented an interconnect to a fixed network will cause all messages destined for fixed networks to fail at this point. Even where a fixed network supports an interconnect that allows its customers to receive SMS on fixed network terminals, only a minority of customers are likely to have suitable fixed network terminals. An embodiment of the invention solves this problem, by permitting every fixed network customer to be reachable using a text message sent from a mobile phone, with the text message being converted and deliverable by e-mail. Preferably the delivery is effected by e-mail only if the recipient does not have an SMS capable fixed network terminal, otherwise the message may be delivered directly to the terminal as a text message.

According to a first aspect of the invention there is provided telecommunications network apparatus comprising determination equipment which is configured to determine whether a message is provided with a destination address which is associated with a fixed network, and conversion equipment which is configured to substitute an

- e-mail address for a destination address which is associated with a fixed network, the e-mail address being associated with the destination address, the apparatus being such that, in use, the determination equipment determines whether the message is provided with a destination address
- 5 associated with a fixed network, the conversion equipment receiving at least some of the messages which have been so determined, said conversion equipment substituting an e-mail address for the destination address of the message, the e-mail address being associated with the destination address.
- 10 The term 'message' is used herein to mean at least one of textual, graphic, audio and video material which is sent to a telecommunications address via a telecommunications network. Typically a message can take any of a number of formats including an SMS message, EMS (Enhanced Messaging Service) message or MMS (Multimedia Messaging Service)
- 15 message.

Preferably the conversion equipment is provided with an associated memory, the memory comprising a database of destination addresses associated with at least one fixed network, and further comprising e-mail addresses, the e-mail addresses being associated with the destination

20 addresses. The database desirably comprises a look-up table which allows an e-mail address to be located which is associated with a particular destination address.

There is preferably provided verification equipment which is operative to determine whether a message which is provided with a destination

25 address which is associated with a fixed network is capable of being sent to the destination address in a format in which the message was originally sent, for example because the destination address is provided with a

suitably capable telephone terminal. It will be appreciated that the determination equipment and the verification equipment may be provided as an integral module or unit and, in a preferred embodiment, as a SMS router.

- 5 In a highly preferred embodiment connectivity problems between mobile networks and a fixed network are solved by providing a means for translation of text messages addressed to fixed network subscribers into an e-mail format, and further by providing any or all of the fixed network subscribers with an e-mail address through which they may
10 retrieve the message.

Preferably a technique known as grooming is used. In a preferred embodiment, prior to arrival at the SMSC, short messages are groomed by an SMS router. The network is arranged so that all mobile originated (MO) short messages pass through an SMS router prior to possibly
15 arriving at an SMSC in the network. The SMS router will examine certain characteristics, e.g. the destination number, of each SMS message. Those messages that have a destination number associated with the fixed network for which short message interconnect is desired may then be diverted by the SMS router away from the SMSC. In the absence
20 of alternative interconnect arrangements together with a compatible fixed network SMS terminal, the message is then converted to an e-mail format. The destination address from the text message is used to look up or otherwise derive the associated e-mail address for the destination subscriber. Beneficially the fixed network operator or a third party could
25 provide a default e-mail address for each subscriber to the fixed network, and also allow subscribers to optionally override this default with an e-mail address of their choice. The e-mail address chosen by the subscriber could be any valid e-mail address, and need not be restricted

to any particular service provider. In the absence of such a user-provided address, a default e-mail address provided by the network might be of the form 01234456789@fixednetwork.com or similar.

5 One aspect of the invention may be viewed as providing an alternative to wired interconnects with multiple fixed network operators, possibly also involving modification of the SMSCs, which can be very cost effective. The advantages are particularly great for operators who have already installed, or are considering installation of SMS routers for other applications, although it would be possible to install one or more SMS
10 routers specifically for the purpose of grooming traffic to an e-mail converter.

The fixed network may also provide means for alerting the fixed network subscriber to the arrival of a message, for example by the use of stuttered dial-tone on his telephone. It is also possible to integrate the e-mail
15 access with interactive voice response system in known ways to permit e-mail retrieval and processing using just a telephone.

The conversion equipment may be configured to send an alert signal to the destination address associated with a fixed network when the message is sent to the e-mail address, the alert signal being indicative of the
20 message having been sent to the e-mail address

The apparatus may be operable to alert the fixed network subscriber to the arrival of an e-mail.

The conversion equipment may be configured to provide with the message a reply address, the reply address comprising an address of the conversion equipment.

5 The conversion equipment may store a representation of an originating address of a sender of the message as part of the reply address.

The conversion equipment is preferably configured to be capable of receiving a reply to the message from the e-mail address, and on receiving the reply the conversion equipment determines the originating address which has been represented as part of the reply address, and
10 sends the reply to the originating address.

The apparatus may be operable to allow a fixed network subscriber with an SMS capable terminal to send a text message to another fixed network subscriber whether or not that recipient has an SMS capable fixed telephone terminal.

15 The apparatus may be operable to allow a text message sent to a non-geographic fixed network telephone number to be translated to e-mail and delivered to an appropriate e-mail address, with a capability for reply.

The determination equipment is preferably operative to forward messages determined to comprise a destination address associated with a fixed
20 network to the conversion equipment.

The determination equipment preferably comprises router equipment.

The message may comprise an SMS message, an EMS (Enhanced Messaging Service) message or an MMS (Multimedia Messaging Service) message.

5 According to a second aspect of the invention there is provided a telecommunications network comprising telecommunications network apparatus in accordance with the first aspect of the invention

10 According to a third aspect of the invention there is provided a method of controlling traffic in a telecommunications network comprising determining whether a message is provided with a destination address associated with a fixed network, and substituting an e-mail address for the destination address of the message, the e-mail address being associated with the destination address.

The method desirably comprises searching a database to locate an e-mail address which is associated with the destination address.

15 The method preferably comprises analysing a characteristic of the destination address.

The method preferably comprises verifying whether the message is capable of being sent to the destination address in a format in which the message was originally sent.

20 Preferably the method comprises providing a reply address with the message, representing an originating address of a sender of the message as part of the reply address.

The method may comprise sending an alert signal to the destination address on sending the message to the e-mail address.

According to a fourth aspect of the invention there is provided telecommunications apparatus which comprises a data processor, a memory, an input and an output, the apparatus being configured such that in use when the input receives a message which comprises a destination address which is associated with a fixed network, the data processor is operative to compare the destination address with a plurality of destination addresses associated with at least one fixed network which are stored in the memory, locate an e-mail address which is associated with the destination address in question, and the data processor then being operative to substitute the associated e-mail address for the destination address and send the message to the output.

Various embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawing in which:

Figure 1 is a block diagram of apparatus in accordance with the invention which has been installed in a telecommunications network.

Referring to Figure 1, a mobile user transmits a short text message from a mobile terminal 6. The message is addressed to a telephone number in an associated fixed telephone network. The message also carries an address of a Short Message Service Centre 2. The mobile network 8 is configured to route all mobile originated short messages via SMS routers 1, which are able to filter the messages en route to the SMSC 2. The SMS router is able to distinguish traffic destined for the fixed network at least by means of distinct number ranges used in the first part

of the network address. For example, in the UK all mobile personal telephone numbers begin 07, while fixed line telephone numbers begin 01 or 02. It would also be possible to allow mobile users to obtain access to other fixed line services such as non-geographic numbers, premium rate numbers and special rate numbers where these are adapted to support reception of SMS or other messaging services. White lists on the SMS router 1 could be used to determine which number prefixes were groomed, and to which network.

The SMS router 1 may be autonomous or connected to an SMS Service Controller which can provide centralised intelligence. In the illustrated arrangement the SMS router 1 serves to groom (ie separate) all MO SMS traffic that is destined for the associated fixed telephone network. The groomed traffic is re-routed to an e-mail converter 3. Traffic that is not groomed in this way is passed transparently to an SMSC 2. The SMS router can interface with pre-pay charging systems and produce call detail records or billing records as required for use in re-charging the users for sending text messages. The e-mail converter 3 uses a lookup or database means, which may be either internal or external, to derive a routing address from the text message destination number that it receives. The database may contain an indication of whether or not the desired recipient has a fixed-line SMS-capable terminal, in which case the message may be routed to existing delivery means for presentation at the fixed terminal. Alternatively, and in most cases, the database will provide an e-mail address to which the message is to be delivered. The converted and addressed message is then routed via an e-mail network 4 for access at the recipient's terminal 5.

The fixed network user may be alerted to the arrival of an e-mail message by known means, for example interrupted dial tone.

The fixed network subscriber is preferably permitted to set or modify the e-mail translation that will be performed on SMS messages sent to his fixed telephone number. This configuration may be achieved by self-provisioning an e-mail address of the user's choice using the web, e-mail, an interactive voice service, SMS or other means. In the absence of a self-provisioned e-mail address translation, the network will preferably provide a default e-mail address, for example a web-mail address, that the user can access over the Internet.

The user is preferably also able to reply to an e-mail received in the manner described above. A reply capability is set up by the e-mail converter 3 during transmission of the original message. The e-mail converter 34, in addition to translating the fixed telephone number into a destination e-mail address, also inserts a reply address into the e-mail message that causes any reply to be delivered to the e-mail converter. The reply address is so constructed so as to also contain representation of the mobile number of the originator of the original message. Furthermore, by determining the originating address that is represented in the reply, the e-mail converter is able to identify the mobile telephone number to which the reply SMS message may be sent. The SMS message may then be delivered either directly as a mobile terminated SMS message from the SMS router, or indirectly as a mobile originated SMS via the SMSC.

The "representation of the mobile number of the originator" is intended to cover a means by which the e-mail converter is able to ascertain the original sender for the purpose of directing a reply. This could either be by inserting the actual mobile number into the address, or by inserting an alternative representation, which may be termed a correlation ID (identity), that will enable the e-mail translator to identify the mobile

number from the correlation ID. This could be done for example by a lookup table. The e-mail translator generates unique correlation IDs and stores them in a table along with the associated mobile number. It is then able to later lookup the mobile number.

- 5 Although the invention has herein been described by means of an embodiment using an SMS router, the invention could alternatively be implemented at the Short Message Service Centre or Multimedia Message Service Centre.

10 The invention is also applicable to a fixed network that has provision to receive text messages from one or more mobile networks. In this case, some subscribers of the fixed network will have text message capable terminals that can send text messages to and receive messages from a mobile network. The invention opens up the possibility for these fixed network subscribers to be able to send messages to other fixed network subscribers on their own network who were hitherto unable to receive
15 such messages. In this case the invention could be implemented as an adjunct to the fixed network equipment installed for the purpose of sending messages to and receiving messages from a mobile network. This could use SMS routers or another means, but the inventive principles of
20 determining that the destination address is a fixed network number, and providing an appropriate translation to e-mail when message delivery is not possible remain unchanged.

A further benefit of the described grooming of text messages sent to fixed telephone numbers is that there is no HLR lookup required in the
25 mobile telephone network in order to effect delivery. The destination route is inferred completely from the text message by the SMS router.

Message delivery by this means can therefore reduce network loading compared with normal delivery via an SMSC.

The present invention is equally applicable to single and multiple fixed networks in association with zero or more mobile networks.

- 5 Preferably fixed network subscribers are advantageously able to receive short message traffic from multiple mobile networks. A mutually beneficial commercial arrangement may be reached between the mobile network and the fixed network for cross charging for transmission and delivery of short messages by e-mail. In this way both operators benefit
10 from a share in the revenue from SMS traffic which otherwise would not have been possible. This traffic also encourages reply traffic, which further boosts revenue for both operators.

- Furthermore the e-mail address associated with a fixed network subscriber number may be made available to multiple other networks.
15 This permits a subscriber on any network, mobile or fixed, to have the capability to send a text message to a fixed network subscriber, provided the sender's terminal and network have text-message sending capability. The capability for a fixed network subscriber with a text message capable fixed terminal to send a text message to any other fixed network
20 subscriber whether or not they have a text message capable terminal is a significant advantage of the invention.

- In one embodiment of the invention the apparatus is operable to permit the fixed network subscriber to reply to the said e-mail, the reply being directed via the apparatus, the apparatus being operable to translate the
25 destination address of the reply into a mobile telephone address and to deliver the reply to the mobile subscriber in text message format.

One key advantage of the illustrated arrangement over the prior art is that it opens up the entire population of subscribers of a fixed network as potential recipients for text messages. This new capability is expected to lead to further growth in SMS traffic, as is indicated by the historical precedent of the large boost to SMS traffic that was engendered by the introduction of SMS interworking between national mobile networks in the UK.

CLAIMS

1. Telecommunications network apparatus comprising determination equipment which is configured to determine whether a message is provided with a destination address which is associated with a fixed network, and the apparatus further comprising conversion equipment which is configured to substitute an e-mail address for a destination address which is associated with a fixed network, the e-mail address being associated with the destination address, the apparatus being such that, in use, the determination equipment determines whether the message is provided with a destination address associated with a fixed network, the conversion equipment receiving at least some of the messages which have been so determined, said conversion equipment substituting an e-mail address for the destination address of the message, the e-mail address being associated with the destination address.
2. Telecommunications network apparatus as claimed in claim 1 in which the conversion equipment is provided with an associated memory, the memory comprising a database of destination addresses associated with at least one fixed network, and further comprising e-mail addresses, the e-mail addresses being associated with the destination addresses.
3. Telecommunications network apparatus as claimed in claim 2 in which the database comprises a look-up table which allows an e-mail address to be located which is associated with a particular destination address.
4. Telecommunications network apparatus as claimed in any preceding claim comprising verification equipment which is operative to

determine whether a message which is provided with a destination address which is associated with a fixed network is capable of being sent to the destination address in a format in which the message was originally sent.

- 5 5. Telecommunications network apparatus as claimed in any preceding claim in which the conversion equipment can be configured to provide with the message a reply address, the reply address comprising an address of the conversion equipment.
- 10 6. Telecommunications network apparatus as claimed in claim 5 in which the conversion equipment stores a representation of an originating address of a sender of the message as part of the reply address.
- 15 7. Telecommunications network apparatus as claimed in claim 6 in which the conversion equipment is configured to be capable of receiving a reply to the message from the e-mail address, and on receiving the reply the conversion equipment determines the originating address which has been represented as part of the reply address, and sends the reply to the originating address.
- 20 8. Telecommunications network apparatus as claimed in any preceding claim in which the conversion equipment is configured to send an alert signal to the destination address associated with a fixed network when the message is sent to the e-mail address, the alert signal being indicative of the message having been sent to the e-mail address.
9. Telecommunications network apparatus as claimed in any preceding claim in which the determination equipment is operative to

forward messages determined to comprise a destination address associated with a fixed network to the conversion equipment.

10. Telecommunications network apparatus as claimed in claim 9 in which the determination equipment comprises router equipment.

5 11. Telecommunications network apparatus as claimed in any preceding claim wherein the message comprises at least one of an SMS message, an EMS message and an MMS message.

12. A telecommunications network comprising telecommunications network apparatus as claimed in any preceding claim.

10 13. A method of controlling traffic in a telecommunications network comprising determining whether a message is provided with a destination address associated with a fixed network, and substituting an e-mail address for the destination address of the message, the e-mail address being associated with the destination address.

15 14. A method as claimed in claim 13 which comprises searching a database to locate an e-mail address which is associated with the destination address.

15. A method as claimed in claim 13 or claim 14 which comprises analysing a characteristic of the destination address.

20 16. A method as claimed in any of preceding claims 13 to 15 which comprises verifying whether the message is capable of being sent to the destination address in a format in which the message was originally sent.

17. A method as claimed in any of claims 11 to 16 which comprises providing a reply address with the message, representing an originating address of a sender of the message as part of the reply address.

18. A method as claimed in any of claims 11 to 17 which comprises
5 sending an alert signal to the destination address on sending the message to the e-mail address.

19. Telecommunications apparatus which comprises a data processor, a memory, an input and an output, the apparatus being configured such that in use when the input receives a message which comprises a
10 destination address which is associated with a fixed network, the data processor is operative to compare the destination address with a plurality of destination addresses associated with at least one fixed network which are stored in the memory, locate an e-mail address which is associated with the destination address in question, and the data processor then
15 being operative to substitute the associated e-mail address for the destination address and send the message to the output.

20. Telecommunications network apparatus substantially as hereinbefore described and as shown in the accompanying drawing.

21. A method of controlling traffic in a telecommunications network
20 substantially as hereinbefore described and as shown in the accompanying drawing.

22. A telecommunications network substantially as hereinbefore described and as shown in the accompanying drawing.



INVESTOR IN PEOPLE

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Claims searched: 1-19

Examiner: Hannah Sylvester
Date of search: 16 April 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	WO01/97473A1 (HOSKENS ET AL)
X	At least: 1, 2, 13 and 19.	WO97/28518A1 (TALTON)
A, E	-	DE10131509A (VODAFONE)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC⁶:

H4L, H4K

Worldwide search of patent documents classified in the following areas of the IPC⁷:

H04L, H04Q, H04M, G08B

The following online and other databases have been used in the preparation of this search report:

WPI EPODOC PAJ